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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/660,054	09/11/2003	Shigeru Yamane	MAT-8260US1	7291
23122	7590	08/02/2007	EXAMINER	
RATNERPRESTIA			CROUSE, BRETT ALAN	
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VALLEY FORGE, PA 19482-0980			1774	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/660,054

Applicant(s)

YAMANE ET AL.

Examiner

Brett A. Crouse

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 May 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 37,40,41,47,59,66,69,70,76 and 83-87 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 37,40,41,47,59,66,69,70,76 and 83-87 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

This office action is in response to the amendment, filed 17 May 2007, which cancels claims 44 and 73, amends claims 37, 41, 47, 59, 66, 70, and 76, and adds new claims 83-87. Claims 37, 40, 41, 47, 59, 66, 69, 70, 76 and 83-87 are pending in the application.

Response to Amendment

Applicant's arguments, filed 17 May 2007, with respect to the rejections of:

claims 66, 69, 70, 73, and 76 under 35 U.S.C. 102(b) as being anticipated by (Fushiki et al., US 4,572,859) as evidenced by (Paper on Web, <http://www.paperonweb.com/density.htm>);

claims 37, 40, 41, and 44 under 35 U.S.C. 103(a) as being unpatentable over (Fushiki et al., US 4,572,859) as applied to claims 66, 69, 70, 73, and 76 above, and further in view of (Taneda et al., US 5,263,243) evidenced by (New types of polymer particles, Sigma-Aldrich, Analytix, May 2001);

claims 37, 40, 41, 44, 47 and 59 under 35 U.S.C. 103(a) as being unpatentable over (Fushiki et al., US 4,572,859) as applied to claims 66, 69, 70, 73, and 76 above, and further in view of (Nakatani et al., US 6,096,411) hereinafter known as Nakatani; and

claims 66, 70, 73, and 76 under 35 U.S.C. 102(b) as being anticipated by (Yoshimitsu et al., US 5,120,384) as evidenced by (Thermoplastic pultrusion of natural fibre reinforced composites, Van de Velde et al., Composite Structures, Volume 54, Issues 2-3, November-December 2001, pages 355-360);

have been fully considered and are persuasive. The rejections have been withdrawn.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 66, 69, 70, 76, 85 and 87 are rejected under 35 U.S.C. 102(b) as being anticipated by Gause et al., US 3,895,158 hereinafter known as Gause as evidenced by (Paper on Web, <http://www.paperonweb.com/density.htm>) and as evidenced by Yuhas et al., US 5,350,621.

Gause teaches:

Column 3, lines 15-38, teach a laminate structure comprising resin impregnated cellulosic fiber paper layer(s) between resin impregnated woven glass fiber layers. The paper layers can be partially cured to the B-stage. Additionally, metal foils can be added to the outer woven glass fabric layers. The laminates can additionally be drilled and punched.

Column 4, lines 41-60, teach formation of the resin impregnated glass fabric layer(s). The layers are partially cured to a B-stage, thus teaching a semi-cured thermosetting resin.

Column 5, lines 25-30, teach that a resin rich surface can be provided upon the impregnated layer(s). This is held to teach a resin layer formed on the fiber sheet.

Column 7, line 39 through column 9, line 46, example 1 and Column 10, lines 1-9, example 3, teach as example 3 laminate structure, formed by the method of example 1, having paper layer(s) sandwiched between glass fabric layers in which identical resins are

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used in the paper layer(s) and glass fabric layer(s). This provides the structures of first, second and third layers of the claims with the two glass fabric layers acting as the first and second layers of claim 76.

As Evidenced by References:

Paper on Web provides the density of papers. Yuhas et al., table 1, columns 3/4, provides the density of glass fabrics commonly used in printed wiring boards. The density of both materials overlaps applicant's claimed density range(s).

Claims 66, 69, 70, 76, 85 and 87 are rejected under 35 U.S.C. 102(b) as being anticipated by Yuhas et al., US 5,350,621 hereinafter known as Yuhas.

Yuhas teaches:

Column 1, line 41 through column 2, line 2, teaches it is a purpose of the invention to provide a method for calculating the laminate coefficient of thermal expansion as a function of fiber volume to reduce the number of registration errors during the manufacture of printed wiring boards.

Column 3, lines 28-30, teach that the impregnated cloth can be B-staged. The prepreg can additionally be laid-up with at least one sheet of conductive metal.

Column 2, line 43 through column 3, line 12, teaches that the resin of the laminate can reinforced with various fibers. The passage also provides various examples of suitable thermoset resins.

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Column 4, lines 33-39, table I, teach glass fabric styles commonly used in the art for multilayer laminates. Table I provides density data for the various styles. The densities range between 651 kg/m^3 for style 106 and 2825 kg/m^3 for style 7628.

Column 5, lines 37-59, table II, teaches eight preferred styles of glass fabric. The density of each of the styles is about 800 kg/m^3 .

Column 6, lines 38-42, teach that the laminate can be provided with holes and the layers interconnected via the holes by plating with copper.

Column 6, lines 43-55, teach multilayer laminates for a printed circuit board which commonly can have up to three layers of different types of fabric. The laminate also employs a bonding sheet to provide uniform thickness of the board. The bonding sheets additionally provide excess resin to fill in between the circuitry on the board. This is held to teach a resin layer on the fabric surface.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

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2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 37, 40, 41, 47, 83, 84 and 86 are rejected under 35 U.S.C. 103(a) as being unpatentable over of Kawakita et al., US 5,960,538 hereinafter known as Kawakita, in view of Gause et al., US 3,895,158 hereinafter known as Gause as evidenced by (Paper on Web, <http://www.paperonweb.com/density.htm>) and as evidenced by Yuhas et al., US 5,350,621 Kawakita teaches:

Column 3, lines 27-60, teach a method of making a printed circuit board.

Column 3, line 61 through column 4, line 39, teach additional methods of making a circuit board.

Column 10, line 51 through column 14, line 65, examples 1-4, provide examples of circuit boards formed by the methods taught by Kawakita.

Kawakita does not teach:

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Kawakita is silent with respect to the density of the aramid-epoxy sheet(s) used as the prepreg(s) of the examples. However, Kawakita provides multiple layer prepreps having at least three layers. (i.e. a first, second and third layer)

Gause teaches:

Column 3, lines 15-38, teach a laminate structure comprising resin impregnated cellulosic fiber paper layer(s) between resin impregnated woven glass fiber layers. The paper layers can be partially cured to the B-stage. Additionally, metal foils can be added to the outer woven glass fabric layers. The laminates can additionally be drilled and punched.

Column 4, lines 41-60, teach formation of the resin impregnated glass fabric layer(s). The layers are partially cured to a B-stage, thus teaching a semi-cured thermosetting resin.

Column 5, lines 25-30, teach that a resin rich surface can be provided upon the impregnated layer(s). This is held to teach a resin layer formed on the fiber sheet.

Column 7, line 39 through column 9, line 46, example 1 and Column 10, lines 1-9, example 3, teach as example 3 laminate structure, formed by the method of example 1, having paper layer(s) sandwiched between glass fabric layers in which identical resins are used in the paper layer(s) and glass fabric layer(s). This provides the structures of first, second and third layers of the claims with the two glass fabric layers acting as the first and second layers of claim 47.

As Evidenced by References:

Paper on Web provides the density of papers. Yuhas et al., table 1, columns 3/4, provides the density of glass fabrics commonly used in printed wiring boards. The density of both materials overlaps applicant's claimed density range(s).

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Motivation to Combine:

Gause teaches that it is the intent of his invention to provide a laminate for use in printed circuit boards, which is suitable for drilling and punching to create holes suitable for plating. It would be obvious to one of ordinary skill in the art to use for its intended purpose the laminate of Gause as the prepreg material in the process of Kawakita to produce a printed circuit board.

Claim 59 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakita et al., US 5,960,538 hereinafter known as Kawakita, in view of Gause et al., US 3,895,158 hereinafter known as Gause as evidenced by (Paper on Web, <http://www.paperonweb.com/density.htm>) and as evidenced by (Yuhas et al., US 5,350,621) as applied to claims 37, 40, 41, 47, 69 and 83-86 above, and further in view of Nakatani et al., US 6,096,411 hereinafter known as Nakatani.

The teachings of Kawakita in view of Gause as in the rejection above are relied upon. Kawakita in view of Gause does not teach:

Kawakita in view of Gause does not recite non-spherical conductive particles as a component of the conductive paste. Conductive particles are taught generally, however only spherical particles are used in the examples.

Nakatani teaches:

Column 2, lines 33-67, teach a conductive paste for filling inner via holes of a printed circuit board comprising a mixture of fine-grained copper particles and coarse grained insulating particles. The passage further teaches that it the paste provides low viscosity, low volatility, and high continuous printability.

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Column 4, lines 34-35, teach the copper particles can be spherical or non-spherical in shape, for example flakes.

It is prima facie obvious that non-spherical conductive particles can be used in the conductive paste of Kawakita with the expectation that the resulting conductive paste will perform suitably as a via hole filler in a printed circuit board.

Claims 37, 40, 41, 47, 83, 84 and 86 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yuhas et al., US 5,350,621 hereinafter known as Yuhas as applied to claims 66, 69, 70, 76, 85 and 87 above, and further in view of Kawakita et al., US 5,960,538 hereinafter known as Kawakita.

The teachings of Yuhas and Kawakita as in the rejections above are relied upon.

Yuhas does not teach:

Yuhas does not teach a conductive paste, with or without conductive particles, used to fill via holes to provide electrical connection between layers. Yuhas does teach laminating a prepreg to copper cladding, providing via holes and plating the via holes to electrically interconnect the layers.

Kawakita teaches:

Column 3, lines 27-60, teach a method of making a printed circuit board.

Column 3, line 61 through column 4, line 39, teach additional methods of making a circuit board.

It would have been obvious to one of ordinary skill in the art to employ the known method steps of Kawakita to provide a circuit board of Yuhas with an expectation of successfully forming a serviceable circuit board.

Claim 59 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yuhas et al., US 5,350,621 hereinafter known as Yuhas, in view of Kawakita et al., US 5,960,538 hereinafter known as Kawakita, as applied to claims 37, 40, 41, 47, 69 and 83-86 above, and further in view of Nakatani et al., US 6,096,411 hereinafter known as Nakatani.

The teachings of Yuhas in view of Kawakita as in the rejection above are relied upon. Yuhas in view of Kawakita does not teach:

Yuhas in view of Kawakita does not recite non-spherical conductive particles as a component of the conductive paste. Conductive particles are taught generally, however only spherical particles are used in the examples.

Nakatani teaches:

Column 2, lines 33-67, teach a conductive paste for filling inner via holes of a printed circuit board comprising a mixture of fine-grained copper particles and coarse grained insulating particles. The passage further teaches that it the paste provides low viscosity, low volatility, and high continuous printability.

Column 4, lines 34-35, teach the copper particles can be spherical or non-spherical in shape, for example flakes.

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It is prima facie obvious that non-spherical conductive particles can be used in the conductive paste of Kawakita with the expectation that the resulting conductive paste will perform suitably as a via hole filler in a printed circuit board.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brett A. Crouse whose telephone number is 571-272-6494. The examiner can normally be reached on Monday - Friday 6:00AM - 2:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Milton Cano can be reached on 571-272-1398. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BAC, 27 July 2007


JILL GRAY
PRIMARY EXAMINER